

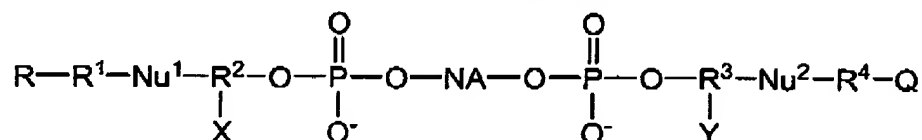
Appl. No. 09/591,185
 Amdt. dated 02/16/05
 Reply to Office Action dated November 12, 2004

PATENT

Listing of Claims:

1-31. (Canceled)

32. (Currently amended) A probe nucleic acid compound having the formula



wherein,

NA is a nucleic acid chain comprising nucleic acid monomers selected from the group consisting of natural nucleic acids, modified nucleic acids and combinations thereof;

R¹, R², R³ and R⁴ are linker moieties independently selected from the group consisting of substituted or unsubstituted alkyl and substituted or unsubstituted heteroalkyl;

Nu¹ and Nu² are members independently selected from the group consisting of nucleotide residues and nucleoside residues;

R is a molecular energy transfer donor;

Q is a molecular energy acceptor; and

X and Y are the same or different and are non-nucleic acid stabilizing moieties that interact to bring R and Q into operative proximity, thereby enabling transfer of energy from R to Q, wherein said probe nucleic acid sequence is not hybridized to a target nucleic acid.

33. (Previously Presented) The compound according to claim 32, wherein said molecular energy transfer donor is a fluorophore.

34. (Previously Presented) The compound according to claim 32, wherein said molecular energy acceptor is a fluorescence quencher.

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1 35. (Previously Presented) The compound according to claim 32, wherein X
2 and Y are both hydrophobic moieties.

1 36. (Previously Presented) The compound according to claim 35, wherein X
2 and Y are members independently selected from the group consisting of saturated hydrocarbons,
3 unsaturated hydrocarbons, steroids, fatty acids, fatty alcohols and hydrophobic peptides.

1 37. (Previously Presented) The compound according to claim 32, wherein
2 natural nucleic acids are members selected from the group consisting of deoxyribonucleotides,
3 ribonucleotides and combinations thereof.

1 38. (Previously Presented) The compound according to claim 32, wherein
2 said modified nucleic acids are peptide nucleic acids.

1 39. (Previously Presented) The compound according to claim 32, wherein
2 said nucleic acid monomers are joined by linkages that are members independently selected from
3 the group consisting of phosphodiesters and modified phosphodiesters.

1 40. (Previously Presented) The compound according to claim 39, wherein
2 said modified phosphodiesters are members selected from the group consisting of
3 phosphorothioates and phosphoramidates.

1 41. (Previously Presented) The compound according to claim 32, wherein
2 said nucleic acid chain further comprises a hybridization enhancing moiety.

1 42. (Previously Presented) The compound according to claim 41, wherein
2 said hybridization enhancing moiety is a member selected from the group consisting of
3 intercalating agents, minor groove binders and modified exocyclic bases.

1 43. (Cancel)

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44. (Previously Presented) The compound according to claim 32, wherein said compound is immobilized on a solid surface.

45. (Previously Presented) A method for amplifying a polynucleotide, wherein a compound according to claim 32 is a primer in said method, said method comprising:

- (a) hybridizing said primer to said polynucleotide; and
- (b) amplifying said polynucleotide.

46. (Previously Presented) The method according to claim 45, wherein said amplifying is a member selected from the group consisting of polymerase chain reaction (PCR), nucleic acid sequence based amplification (NASBA), strand displacement amplification (SDA) and combinations thereof.

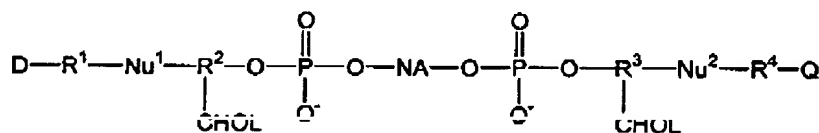
47. (Previously Presented) A method for detecting or quantitating a nucleic acid, wherein the compound according to claim 32 is used as a probe, said method comprising:

- (a) hybridizing said compound to said nucleic acid; and
- (b) detecting a change in fluorescence of said compound, thereby detecting or quantitating said nucleic acid.

48. (Previously Presented) The method according to claim 47, wherein said method comprises a member selected from the group consisting of 5'-nuclease assay, rolling circle amplification and combinations thereof.

49. (Previously Presented) A kit for quantitating nucleic acid, said kit comprising a compound according to claim 32.

50. (Previously Presented) A compound having the formula:



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wherein,

CHOL is a cholesterol derivative;

R^1 , R^2 , R^3 and R^4 are linker moieties independently selected from the group consisting of substituted or unsubstituted alkyl and substituted or unsubstituted heteroalkyl;

Nu^1 and Nu^2 are members independently selected from the group consisting of nucleotide residues and nucleoside residues;

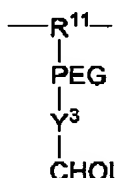
NA is a nucleic acid sequence;

D is a donor of light energy; and

Q is a quencher of light energy,

wherein the CHOL moieties interact to bring D and Q into operative proximity, thereby enabling transfer of energy from D to Q.

51. (Previously Presented) The compound according to claim 50, wherein R^2 -CHOL and R^3 -CHOL are independently selected and have structures according to the formula:



wherein,

R^{11} is a member selected from the group consisting of substituted or unsubstituted alkyl and substituted or unsubstituted heteroalkyl;

PEG is polyethylene glycol;

Y^3 is an organic functional group adjoining said PEG to said CHOL.

52. (Previously Presented) The compound according to claim 51, wherein said PEG has from about 2 to about 20 ethylene glycol subunits.

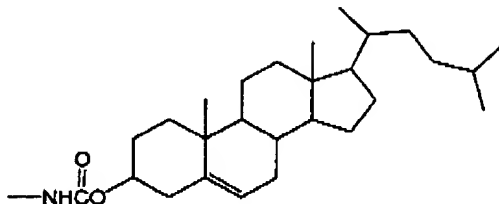
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53. (Previously Presented) The compound according to claim 51 in which R¹¹ is substituted or unsubstituted alkyl.

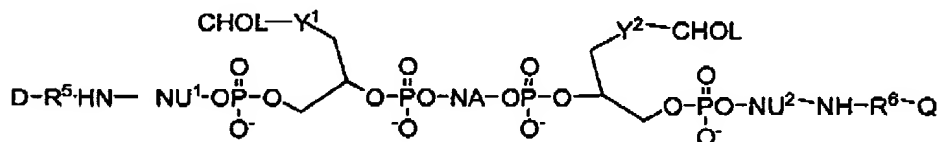
54. (Previously Presented) The compound according to claim 53, wherein R¹¹ is C₁-C₆ substituted or unsubstituted alkyl.

55. (Previously Presented) The compound according to claim 51, wherein Y³-CHOL has the structure:



56. (Previously Presented) The compound according to claim 50, wherein Nu¹ and Nu² are nucleotides having an exocyclic amine group to which -R¹-D and -R⁴Q are attached, respectively.

57. (Previously Presented) A compound having the formula:



wherein,

NA is a nucleic acid sequence;

Nu¹ and Nu² are members independently selected from the group consisting of nucleotide residues and nucleoside residues;

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Y¹ and Y² are linking groups independently selected from the group consisting of substituted or unsubstituted alkyl and substituted or unsubstituted heteroalkyl;

R⁵ and R⁶ are linking groups independently selected from the group consisting of substituted or unsubstituted alkyl and substituted or unsubstituted heteroalkyl;

D is a donor of light energy; and

Q is a quencher of light energy,

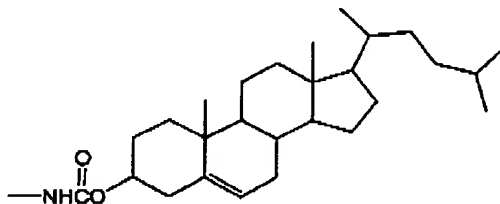
wherein each CHOL interacts with the other CHOL to bring D and Q into operative proximity, thereby enabling transfer of energy from D to Q.

58. (Previously Presented) The compound according to claim 57, wherein Y¹ and Y² are members independently selected from substituted or unsubstituted heteroalkyl.

59. (Previously Presented) The compound according to claim 58, wherein Y¹ and Y² are polyethylene glycol.

60. (Previously Presented) The compound according to claim 59, wherein said polyethylene glycol has from about 2 to about 20 ethylene glycol subunits.

61. (Previously Presented) The compound according to claim 57, wherein Y¹-CHOL and Y²-CHOL have the structure:



62. (Cancel)